

Amendments to the Specification

IN THE ABSTRACT OF THE DISCLOSURE

Attached hereto is a replacement (or new) Abstract.

IN THE WRITTEN DESCRIPTION

Please replace the paragraph beginning at page 1, line 2, with the following rewritten paragraph:

The present invention relates to a tape for polishing the surface of a substrate for a recording medium in the step of producing a magnetic recording medium.

Please replace the BACKGROUND ART section with the following marked-up copy of the section.

As described in Examined Patent Publication (Kokoku) No. 7-13841 and Unexamined Patent Publication (Kokai) No. 8-96355, a magnetic recording medium obtained by subjecting a substrate made of an aluminum alloy to a non-magnetic plating treatment such as an alumite treatment, Ni-P plating or the like, coating with a primary layer of Cr, coating with a magnetic thin film layer of a Co-based alloy, and then coating with a carbonaceous protective film has hitherto been used exclusively as a magnetic recording medium.

Such a magnetic recording medium (magnetic disc) has a high dimensional accuracy and is liable to exhibit an enhanced recording density because of its hard substrate. When a magnetic head is contacted with a magnetic disk rotating at high speed, there arises a so-called head crushing to break down the magnetic head. To avoid head crushing, the magnetic head is employed in ~~the levitation~~ a levitated state.

However, with the increase of the density of the magnetic disk, the levitation height of the head decreases more and

more and ~~the~~a levitation height of not more than $1.5\text{ }\mu\text{m}$ ~~is~~has recently been required. It is the greatest point for improvement in recording density to maintain the levitation height of the ~~heat~~head at a very small value, and it is the greatest technical object to prevent head crushing while maintaining a low levitation height.

Studying about the magnetic disk, absorption sometimes arises between the levitated surface of the magnetic head and the magnetic disk when the disk is at a standstill in the case of writing ~~in~~on the magnetic disk or reproduction.

The adsorption phenomenon described above is caused by the fact that, when the levitated surface of the magnetic head and the surface of the magnetic disk are very smooth and mutually face ~~mutually~~ at a microspace, the microspace is filled with molecules such as O_2 , N_2 , H_2O , etc. and a large adsorptivity is caused by a surface tension. Such ~~the~~an adsorption phenomenon causes such a disadvantage that a large amount of ~~a~~electric power is consumed on the starting of a motor.

To prevent such an adsorption phenomenon, a substrate is textured, that is, the surface of the substrate is ~~onee~~first mirror-finished and then the surface is adjusted to a proper surface roughness by roughening before forming a magnetic film on the substrate.

As the texturing method, the following method has hitherto been employed. For example, a so-called textured substrate can be obtained by directly transferring a Ni-P plated substrate in a radial direction of the substrate while pressing a polishing tape comprising deposited abrasive grains made of silicon carbide, alumina or diamond from the back surface of the tape by means of a roll in the state where the substrate is rotated, thus forming concentric streaks on the surface of the substrate.

However, it is considerably difficult to roughen the surface of the substrate by adjusting to a proper surface

roughness using a conventional polishing tape, thus causing a problem that the surface of the substrate is too roughened.

To solve such a problem, Unexamined Patent Publication (Kokai) NO. 6-295432 has suggested that a constituent fiber of a polishing tape used for texturing is made thin as compared with a conventional one and the surface roughness Ra is adjusted to 40 Å or less by using a polishing tape composed of fibers having a diameter of 5 µm (fineness: 0.1 denier).

Also Unexamined Patent Publication (Kokai) No. 8-96355 has suggested a nonwoven fabric wherein a water retaining rate is not less than 400% and a fiber strength is not more than 11 (kg/5 cm width) in 10% modulus strength (longitudinal direction) when drying and, moreover, a difference between 10% modulus strength (longitudinal direction) when drying and that when wetting is not more than 8 (kg/5 cm width).

The respective polishing tapes described in the publications described above are provided with a characteristic constitution, thereby exerting a peculiar effect. According to a trend for several years ahead (five to six years), fixed abrasive grains have changed gradually into free abrasive grains in a polishing system, whereby a raised tape as a raw tape material has changed into a flocky tape and, moreover, a fabric and a nonwoven fabric as the other raw material ~~change~~has changed into a raw material with a more soft surface. Therefore, these polishing tapes are exclusively used at ~~present~~the present.

In a conventional polishing system, a tape using an abrasive having a large grain size and a fiber having a large single yarn fineness was satisfactorily employed. However, with the increase ~~of~~in the requirement of information density ~~to~~on the substrate, it has been required to develop a polishing tape using a microfiber having a small single yarn fineness, which can sufficiently retain an abrasive having a very small grain size.

In light of circumstances described above, the present invention has been made and an object thereof is to provide a

novel polishing tape which has a polished substrate having a small surface roughness as compared with a conventionally suggested polishing tape and prevents the occurrence of crushing to the utmost, and is also capable of noticeably improving levitation characteristics of the magnetic head.

Please replace the paragraphs beginning at page 5, line 23, with the following rewritten paragraphs:

The invention ~~described in claim 2~~ is also directed to a polishing tape for polishing the surface of a substrate of a magnetic recording medium, said polishing tape being made of a fabric, the sum total of a warp cover factor and a weft cover factor of said fabric being within a range from 2,000 to 4,500, characterized in that a multifilament made of nylon or polyester fibers having a single yarn fineness of not more than 5 d is used as a warp and a multifilament, whose constituent single yarn is formed into a dissolution-decomposition type composite fiber consisting of a nylon component and a dissolving component, is used as a weft, and that 80% or more of a thin-fineness filament obtained by splitting a single yarn of said dissolution-decomposition type composite fiber is formed in fineness of less than 0.3 d.

The invention ~~described in claim 3~~ is also directed to a polishing tape for polishing the surface of a substrate of a magnetic recording medium, said polishing tape being made of a nonwoven fabric, characterized in that a thin-fineness filament obtained by splitting a single yarn of a dissolution-decomposition type composite fiber consisting of a nylon component and a dissolving component is used as a web, and that 80% or more of said thin-fineness filament is formed in a fineness of less than 0.3 d and fiber length within a range from 20 to 120 mm.

Please replace the paragraphs beginning at page 7, line 5, with the following rewritten paragraphs:

Fig. 3 shows a portion of the manufacturing process of a flocked cloth and is a view for explaining a flocking step.

Fig. 4 shows a portion of the manufacturing process of a flocked cloth and is a view for explaining a baking step.

Please replace the paragraph beginning at page 8, line 12, with the following rewritten paragraph:

Also, the tapes 4, 5 reciprocate (vibrate) in the direction indicated by the arrow C by a reciprocating motion of the pressing rolls 6, 7 and streaks are formed on both surfaces of the substrate 1 by this movement and rotation of the substrate 1 itself, thereby forming the textured substrate 1.

Please replace the paragraph beginning at page 9, line 6, with the following rewritten paragraph:

Regarding the flocked cloth, fabric and nonwoven fabric, which constitute the tape of the present invention, a thin-fineness filament obtained by splitting a single yarn of a dissolution-decomposition type composite yarn containing nylon 6 or nylon 66 as a major constituent fiber is used and 80% or more of the thin-fineness filament is formed in a fineness of less than 0.3 d.

Please replace the paragraphs beginning at page 11, line 4, with the following rewritten paragraphs:

The polishing tape made of the flocked cloth can be produced by either a known continuous flocking apparatus of a DOWN system or a known continuous flocking apparatus of an UP system, but the continuous flocking apparatus of an UP system utilizing only a suction force of a high-pressure electrostatic field is superior in that piles as the flock

material can be fixed more perpendicularly to the adherend surface on needle planting and a high-density product can be obtained. Therefore, it is suited for use in the polishing tape of the present invention.

The flocked cloth of this embodiment is produced through the flocking step shown in Fig. 3, the baking step shown in Fig. 4 and the opening processing step (not shown) in order. In the flocking step, a base cloth 12 unreel from a wound cloth 11 continuously ~~travel~~travels in the direction indicated by arrow shown in Fig. 3 and is coated with an adhesive directly under an adhesive tank 13 during its traveling. Piles 16 as a flock material are needle-planted by static electricity at a high-pressure electrostatic field 15 immediately under a flock material hopper 14 and fixed on the base fabric, followed by a drying treatment in a drying chamber 17 using a combustion gas at 100°C for four minutes and further a ~~brushing~~brushing step 18. Then a flocked base cloth 19 is once taken up as a cloth roll 20.

As shown in Fig. 4, the flocked base fabric 19 is coated with an adhesive containing an acrylic acid and a nitrile copolymer emulsion as a principal component and a melamine epoxy crosslinking agent as an auxiliary component by an adhesive recoating apparatus 22 arranged in the process of unreeling from the cloth roll 20 and taking up again as a cloth roll 21.

Please replace the paragraphs beginning at page 12, line 22, with the following rewritten paragraphs:

The dissolution-composition type composite yarn maintains the non-split state in the flocking step and baking step and a pile portion of a flock material protruding from an adhesive layer is split into a thin-fineness filament for the first time by dissolving to remove a polymer having large dissolution properties in the opening processing step, ~~particularly opening process,~~ thus forming a flocked portion.

The base portion of the pile portion is embedded in the adhesive layer.

In a conventional flocking processing using a normal flocking technique, it is carried out to make the fiber rigid and upright, ~~provide~~provided with good conductivity, and make the surface smooth with the help of flying of piles in the electric field. For these purposes, the flock material is previously subjected to a pre-treatment using a mixed solution of 2-8% of inorganic salts, 0.1-2.0% of a surfactant and an organic silicon. The organic silicon has an effect of satisfactorily separating the fiber.

However, when using such a mixed solution, a very small amount of the mixed solution adheres on the whole pile surface of the final flocked cloth, as shown in Fig. 5, resulting in large defects for the polishing tape. To the contrary, according to the embodiment of the present invention, since a constituent single yarn is split by dissolving to remove a polymer component in a dissolution-composition type composite yarn to form a thin-fineness filament, the pile surface is smooth as shown in Fig. 6 and ~~are~~free from the defects described above.

It is necessary that the pile fineness of the flocked cloth in the embodiment of the present invention, i.e. fineness of the thin-fineness filament, is not more than 0.5 d and 80% or more of piles have a fineness of less than 0.3 d. When the fineness is not less than 0.3 d, the degree of freedom of piles to be arranged perpendicularly to the surface of the base cloth is insufficient and the softness is poor so that the polished disk surface is likely to take deep scratches. With the reduction of the size of abrasive grains (following generation), these features are essential to uniformly trap them.

In the final product, the height of piles protruding from the surface of the base cloth is properly within a range from 0.2 to 1.0 mm. When the height is less than 0.2 mm, the degree of freedom of the pile tip is impaired to cause scatter

in flocking density, thus making it impossible to uniformly maintain abrasive grains. On the other hand, when the height exceeds 1.0 mm, there arises a disadvantage that ~~piles are mutually intersected~~ the piles mutually intersect. The pile density (flocking density) is properly within a range from 100 to 200 g/m².

As the base cloth for the flocked cloth, on which piles are directly needle-planted, a twill made of an ester/rayon union yarn has hitherto been used. However, the fabric sometimes causes wrinkles at both selvage portions due to a selvage curling phenomenon of a wound fabric, thereby drastically ~~impair~~ impairing the quality of the product. In this embodiment, the base fabric is produced by a multifilament made of synthetic fibers and the single yarn of the multifilament is formed of a core-sheath type composite yarn wherein a softening point of a sheath component is 20°C or more lower than that of a core component, thus completely solving the drawback described above.

Using polyethylene terephthalate (melting point: 255°C, softening point: 240°C) whose acid component is 100% terephthalic acid, as a core component, and using a polyamide fiber made of nylon 6 or nylon 66 having a softening point, which is 20°C lower than that of polyethylene terephthalate, as a sheath component, such a core-sheath composite fiber is spun at a core-sheath ratio of 1:1, and then the resulting multifilament is used as warps and wefts to give a plain weave, a still or a satin, which is used as a base fabric. The flocked cloth of this embodiment is obtained by flocking the pile described above on the base fabric.

Please replace the paragraph beginning at page 20, line 17, with the following rewritten paragraph:

Major constituent features of the three kinds of polishing tape described above as well as results of use as

tapes 4, 5 in the service aspect shown in Fig. 1 and Fig. 2 are shown in Table 1.

Please replace the paragraph beginning at page 22, line 4, with the following rewritten paragraph:

Major constituent features of the three kinds of polishing tape described above as well as results of use as tapes 4, 5 in the service aspect shown in Fig. 1 and Fig. 2 are shown in Table 2.

Please replace the paragraphs beginning at page 23, line 3, with the following rewritten paragraph:

Using the material used in Example A as a web material for nonwoven fabric of Example E and using the pile material used in Comparative Example A as a web material of Comparative Example C, polishing tapes made of a nonwoven fabric having a tape thickness of 0.6 mm of Example E and Comparative Example C were separately produced through the above manufacturing process of the nonwoven fabric. Major constituent features of the two kinds of polishing tape described above as well as results of use as tapes 4, 5 in the service aspect shown in Fig. 1 and Fig. 2 are shown in Table 3.

Please replace the paragraph beginning at page 24, line 3, with the following rewritten paragraph:

As is apparent from Table 1, Table 2 and Table 3, the polishing tapes of Examples according to the present invention are superior in surface roughness and processing speed to that of the Comparative Examples. As used herein, the term "surface roughness" refers to surface roughness defined in JIS B 1061.

Please replace the INDUSTRIAL APPLICABILITY section with the following marked-up copy of the section.

According to the polishing tape of the present invention, since the surface to be contacted with a substrate to be polished is formed of a thin-fineness filament made of nylon 6 or nylon 66 having a fineness of not more than 0.5 d, preferably less than 0.3 d, which is obtained by splitting a dissolution-decomposition type composite yarn in any of the flocked cloth, fabric and nonwoven fabric, the polishing tape is superior in compatibility with diamond microparticles as an abrasive and has an effect of absorbing a grain size balance of fine powders. For example, even ~~in case where~~when fine powders having a large grain size are suddenly incorporated, the substrate does not take large scratches. Particularly, when using the flocked cloth as a fiber structure, since ~~at the~~the base material of the present invention is a fabric, this effect becomes further remarkable because the base material itself ~~gashas~~has an elastic force.

As described in the opening paragraph, with the increase ~~of~~in the requirement of information density ~~to~~on the substrate, the fineness of constituent fibers of the polishing tape must be reduced. In the present invention, the fineness of constituent fibers can be reduced comparatively easily because thin fineness is attained by splitting the dissolution-decomposition type composite yarn. Therefore, the present invention has an advantage capable of sufficiently coping with the requirement of an improvement in information density by the use of a raw yarn having a fineness thinner than that described above (e.g. not more than 0.15 d, and preferably not more than 0.1 d) as well as size reduction of the abrasive (e.g. diamond microparticles, etc.).